A 2-month-old boy is brought to the emergency department (ED) because of “noisy breathing” that has been present since birth. The parents report that they occasionally see the child’s ribs during inspiration when he is lying down.

A 2-month-old boy is brought to the emergency department (ED) because of “noisy breathing” that has been present since birth. The parents report that they occasionally see the child’s ribs during inspiration when he is lying down.

**HISTORY**
At a well-care visit 1 month earlier, the primary care pediatrician told the parents that findings from the infant’s examination were normal and that he would eventually outgrow these symptoms. One week before presentation, the infant’s breathing had worsened, and his parents brought him to an urgent care clinic with concerns that he was “breathing with his belly.” A chest radiograph was normal. The parents were told the infant had tracheomalacia and that the symptoms would abate as he grew older. Four days before presentation, the parents brought the infant to another ED, where he was given a dose of corticosteroids, after which a modest reduction in symptoms was noted.

**PHYSICAL EXAMINATION**
The infant is afebrile. Other vital signs and growth parameters are normal. Although the infant displays no signs of respiratory distress at rest, he is found to have inspiratory stridor that worsens with crying or when placed supine. He also has mild expiratory stridor heard on auscultation. Physical findings are otherwise unremarkable.

Which of the following would be the appropriate next step?

A. Parental reassurance.
B. Single dose of oral corticosteroid.
C. Otorhinolaryngology (ENT) evaluation for possible laryngoscopy/bronchoscopy.
D. Treatment with inhaled racemic epinephrine.

(Answer and discussion begin on next page.)

Because this patient presented with no overt respiratory distress but with chronic worsening of symptoms after multiple visits to the pediatrician and ED, simple reassurance (choice A) is no longer appropriate. A single dose of an oral corticosteroid (choice B) would be a correct course of action in a case of laryngotracheobronchitis; however, the chronic nature of his stridor and his lack of fever and cough make this diagnosis unlikely. The finding of biphasic stridor that was more prominent with agitation and positioning suggest a fixed obstruction, which points to a probable anatomic cause. The next most appropriate step in this setting is an ENT evaluation (choice C). In this infant, laryngoscopy revealed a subglottic hemangioma (Figure). Inhaled racemic epinephrine (choice D) is appropriate in the setting of acute inflammatory edema of the airway, often seen with infectious causes.
Stridor is a commonly encountered symptom in infants and children that can provoke anxiety in parents and providers alike. As airflow is forced through a narrowed airway, a local area of low pressure creates a vacuum effect distal to the narrowing. This causes the airway walls to collapse and vibrate, generating the highpitched noise of stridor.

When evaluating a child with stridor, regardless of age, attention must be paid to the duration of symptoms, phase of stridor, exacerbating or ameliorating factors, presence of fever, and signs of respiratory distress—such as use of accessory muscles of respiration, strength of cry, and ability to manage oral secretions.

Especially in neonates and infants, it is important to obtain a maternal history to rule out transmission of human papillomavirus infection. It is also critical in this population to determine a patient’s immunization status, because stridor can result from epiglottitis caused by Haemophilus influenzae type b infection.

**Practice Pearl 1:** The history taking in the evaluation of stridor must include the patient’s immunization status and history of maternal human papillomavirus infection.

Isolating the phase in the respiratory cycle during which stridor is heard can elucidate the cause. Inspiratory stridor usually signals airway obstruction at or above the level of the vocal cords and results from collapse of the soft tissues with the negative pressure generated by inspiration. Expiratory stridor most commonly indicates obstruction within the larger portions of the intrathoracic tracheobronchial tree that causes a decrease in airway diameter with expiration. Biphasic stridor usually signifies a fixed obstruction; one phase may be audible only with the aid of a stethoscope. In this patient, stridor was heard in both phases of respiration, with expiratory stridor heard on auscultation only.

**Practice Pearl 2:** Careful examination of the phase of stridor—including what is audible both on initial survey and via auscultation—is a crucial step in identifying its cause.

When considering the cause of stridor, it is helpful to divide suspected diagnoses into anatomic and infectious categories. Bear in mind that infectious causes predispose patients to stridor by changing the anatomy of the airway through edema or inflammation.

**Infectious causes.**
Infectious causes of stridor are more common than anatomic causes. Fever, acute onset, and accompanying symptoms (such as cough and rhinorrhea) are clues that a patient’s stridor has an
Anatomic causes.
A purely anatomic cause of stridor often has a chronic or recurring course and may progressively worsen. Overt respiratory distress is not always present but may be elicited with agitation or with the patient supine. The most common anatomic causes of stridor in infants are laryngomalacia and tracheomalacia. These conditions present by age 6 weeks and usually remit by age 1 to 2 years; symptoms are more prominent with upper respiratory tract infections. Another category of anatomic causes in infants includes laryngeal malformations, such as laryngeal webs, clefts, and cysts or mucoceles. Resulting from aberrant formation and canalization of the larynx during the embryological period, these conditions may present with not only stridor but also feeding difficulty or weak cry. Extratracheal vascular malformations, commonly known as “rings and slings,” can externally compress the airway and cause stridor. Examples of these extratracheal abnormalities include double aortic arch, anomalous innominate artery, aberrant right subclavian artery, and vascular tracheal ring. On laryngoscopy, a pulsating airway indentation may be seen. Further imaging studies are necessary, and cardiothoracic surgical intervention is often required. Intratracheal vascular anomalies, such as airway hemangiomas, can also lead to recurrent stridor. Airway hemangiomas can present anywhere along the tracheobronchial tree. The usual presentation is stridor within a few weeks to a few months of birth. A postnatal proliferative phase—characterized by increased growth of the lesion and worsening obstruction—is followed by a plateau phase and later by spontaneous regression, usually by age 5 years. A tracheostomy may be necessary to bypass the airway obstruction until regression occurs. Newer therapies include laser vaporization and corticosteroid injections. A facial hemangioma may be a clue to an underlying airway hemangioma. Although not present in this patient, any child with a hemangioma in the beard distribution should be evaluated for airway hemangiomas.

Other causes.
The possibility of a foreign body must always be considered, especially in a toddler or in an infant with young siblings. Radiographic findings may include air trapping and hyperinflation on the side of the obstruction. Angioedema in infants and young children with congenital C1-esterase deficiency, anaphylaxis in children with an allergic history, and severe recurrent gastroesophageal reflux disease can also cause laryngeal irritation and resultant inflammation.

Outcome of this case.
The infant was treated by otolaryngology with KTP laser therapy and intralesional triamcinolone injection. After discharge, the patient received oral corticosteroid therapy, which was tapered over the course of several weeks.
the neck, drooling, and fever as well as a thickened retropharyngeal space apparent on a lateral neck radiograph. In contrast, a peritonsillar abscess tends to occur in children older than 10 years and is caused most commonly by group A streptococci and anaerobic bacteria. Both conditions may present with biphasic stridor.

**Bacterial tracheitis.** Bacterial superinfection of a previous viral laryngotracheobronchitis can occur, usually in children older than 2 years. This severe illness is the result of secondary infection, most commonly with *S* aureus and less commonly with *Moraxella catarrhalis* or *H influenzae*. Patients are toxic-appearing, with high fever, barking cough, stridor, and retractions, but usually maintain a normal position and exhibit no drooling or inability to manage secretions. Therapy includes ceftriaxone, and in severe cases, patients may require endotracheal intubation.

**Papillomatosis.** These airway papillomas have a tendency toward spontaneous regression; however, they often necessitate laser therapy for years. Tracheostomy is avoided because this may predispose the patient to pulmonary parenchymal involvement. Human papillomavirus types 6 and 11, which can be acquired by passage through a birth canal affected with condyloma lata, can cause papillomatosis in an infant. Thus, obtaining a maternal history, especially in neonates and infants, is critical in the evaluation of stridor.

---

**Table - Differential diagnosis of stridor in infants and children**

<table>
<thead>
<tr>
<th>Anatomic</th>
<th>Infectious</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laryngomalacia</td>
<td>Group</td>
<td>Spasmodic cough</td>
</tr>
<tr>
<td>Tracheomalacia</td>
<td>Retropharyngeal abscess</td>
<td>Foreign body</td>
</tr>
<tr>
<td>Vocal cord paralysis</td>
<td>Peritonsillar abscess (usually adolescence)</td>
<td>Angioedema (&gt; 2 y)</td>
</tr>
<tr>
<td>Laryngeal cyst</td>
<td>Epiglottitis (usually 2 - 6 y)</td>
<td>Anaphylaxis (&gt; 2 y)</td>
</tr>
<tr>
<td>Laryngeal web</td>
<td>Tracheitis (2 - 6 y)</td>
<td>GERD</td>
</tr>
<tr>
<td>Complete tracheal ring</td>
<td>Mononucleosis (usually adolescence)</td>
<td></td>
</tr>
<tr>
<td>Subglottic hemangioma</td>
<td>Papillomatosis</td>
<td></td>
</tr>
<tr>
<td>Vascular rings/slings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subglottic stenosis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GERD, gastroesophageal reflex disease.  
* Unless otherwise indicated by age groups specified in parentheses, listed conditions occur in infants and young children.


**FOR MORE INFORMATION:**


**Source URL:**


**Links:**

[1] [http://www.physicianspractice.com/authors/elizabeth-burgamy-md](http://www.physicianspractice.com/authors/elizabeth-burgamy-md)